

Highlights of the 59th Conference on Mass Spectrometry and Allied Topics of the ASMS in Denver, Colorado

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Published online: 7 July 2011
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The 59th Conference on Mass Spectrometry and Allied Topics of the American Society for Mass Spectrometry (ASMS) took place from Sunday, June 5th to Thursday, June 9th at the Colorado Convention Center in Denver, Colorado, and once again attracted more than 6000 participants. Denver, also known as the “Mile-High City” because of its official elevation of exactly one mile above sea level, is located in the front range of the Rocky Mountains and offers visitors a glimpse of the snow-covered summits. Unfortunately, the current forest fires in Arizona caused hazy weather and an obstructed view for most of the conference stay, although for a few hours of high visibility wonderful sights could be seen directly from the windows of the convention center.

Aims and topics The ASMS conference is one of the most important annual meetings for mass spectrometrists, attracting participants from all over the world. Its objectives have been to offer a platform for researchers, instrument manufacturers, and users to promote the exchange of knowledge and to generate thought-provoking ideas during discussions and workshops.

Scientific program In preparation for the conference, a number of short courses covering the basics of the most important mass spectrometric techniques were offered on Saturday and Sunday. The program of the conference itself

started with two tutorial lectures given by Mark Duncan and James Jorgensen (University of North Carolina) and a plenary lecture given by Larry Nittler (Carnegie Institution of Washington). During the following four days, scientists, exhibitors, and students could obtain an overwhelming amount of information on the latest instrumental developments and applications of mass spectrometry (MS). During seven parallel sessions, 336 speakers had the honor of presenting their work in talks on topics covering application areas such as systems biology/cellular pathways, energy, petroleum and biofuels, drug discovery and development, identification of posttranslational modifications, imaging of biological samples, plant proteomics, drug metabolism and pharmacokinetics, biomarker quantification, microorganisms, quantitative proteomics, environmental contaminants and health, metabolomics, dried blood spot analysis, clinical chemistry, and analysis of compound classes such as lipids, synthetic polymers, membrane proteins, intact proteins, protein therapeutics, biomarkers, and oligonucleotides. Other sessions focused on methodological and instrumental developments for H/D exchange, biomolecular structure analysis, microscale and nanoscale separations, LC–MS detection of reactive metabolites, imaging MS, ion traps and hybrid instruments, ion mobility techniques, high mass accuracy/high-performance instrumentation, and ambient desorption ionization techniques. Fundamentals of peptide fragmentation, ion spectroscopy, supramolecular chemistry/non-covalent interactions, ion mobility, ion structure and energetics, ion–molecule and ion–ion interactions, and informatics for quantification/validation, identification and for pharmaceutical applications of mass spectrometry were also covered. Two thousand eight hundred twenty researchers, approximately 700 per day, were given the chance to illustrate their results in poster format for 4 h each day. One hundred sixty-five companies demonstrated their developments in specifically assigned booths. Thus, every participant had the chance to find topics of their personal

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interest and meet experts in every field. The abstracts of all contributions are available at <http://www.asms.org>.

Conference highlights Two entertaining tutorial lectures entertained the audience on Sunday. Mark Duncan, a local who works at the University of Colorado, Denver, demonstrated the importance of thorough analytical work and drew attention to unexpected factors interfering with your analysis, for example contamination from woolen sweaters worn by the operator. James Jorgensen creatively drew analogies between Botticelli's famous works and the combination of liquid chromatography and MS as "A Match Made in Heaven". Larry Nittler showed in his plenary lecture how mass spectrometry of tiny stardust grains can reveal information about our stellar origins enabling understanding via "astronomy in the laboratory". After that, a welcome reception with fine food and drink and a first chance to exchange ideas closed the conference day.

While highlighting the most interesting topics out of more than 3,000, it is impossible to do justice to the vast number of excellent presenters. Because of limited space, only few will be mentioned below.

In the numerous sessions dedicated to imaging MS, different approaches with a variety of ionization methods and mass analyzers were introduced. Andreas Römpp (Justus-Liebig-Universität Giessen, Germany) presented recent advances by Bernhard Spengler's group in matrix-assisted laser desorption/ionization (MALDI) imaging of biological tissues. He emphasized the benefits of combining a high-resolution MALDI source, with spatial resolution down to 3 μm , with the high mass accuracy/resolution of an orbitrap analyzer, and thus introduced the concept of HR² MSI. Using an approach that unites in-solution digestion and on-tissue MALDI imaging, simultaneous identification of proteins and their spatial distribution on the tissue becomes possible.

Another field of high interest is the analysis of non-covalent biomolecular interactions by MS. Nina Morgner from Carol Robinson's group (University of Oxford, UK) presented the real-time analysis of the assembly of highly heterogeneous complexes containing the molecular chaperone Hsp90 and the determination of dissociation constants for the whole system with an electrospray ionization (ESI) quadrupole time-of-flight (QTOF) instrument which is optimized for analysis of high-mass protein complexes.

An impressive application of MS as an online tool for intraoperative tissue identification during brain surgery was presented by Zoltan Takats (Justus-Liebig-Universität Giessen, Germany). The ions are produced by bipolar electrosurgery via rapid evaporative ionization or by a cavitron ultrasonic surgical aspirator and transferred into the

mass spectrometer through a PTFE tube. On the basis of a database containing data categorized by histological information and treated by principal-component analysis and linear discrimination analysis, real-time classification of different tumor types and healthy tissue types becomes possible. With incidence of false negative and false positive results of 0% and <1%, respectively, this method is more precise and faster than histology.

In total, five researchers were awarded prizes:

The Award for Distinguished Contribution in Mass Spectrometry was presented to Robert J. Cotter (Johns Hopkins University) for "his invention and development of tandem time-of-flight (TOF/TOF) mass spectrometry that utilizes high-energy collisions (up to 20 keV) for collision-induced dissociations" that potentially enables "top-down" or "middle-down" proteomics on MALDI-TOF spectrometers.

The Biemann Medal was awarded to Béla Paizs (German Cancer Research Center) for his work on the characterization of peptide product ion structures and dissociation mechanisms that led to a comprehensive peptide fragmentation model.

The Ron A. Hites Award for Outstanding Research Publication in JASMS was awarded to Scott A. McLuckey for his article on "Top-Down Tandem Mass Spectrometry to tRNA via Ion Trap Collision-induced Dissociation" Huang, T.-Y. et al. JASMS 2010, Vol. 21(6), 890.

Research Awards sponsored by Thermo Scientific and Waters Corporation were presented to Judit Villen (University of Washington) and Brandon Ruotolo (University of Michigan) for outstanding academic research as young scientists in a Northern American university.

Robert Cotter and Béla Paizs summarized their work in well-attended award lectures.

A regular favorite was the corporate hospitality suites sponsored by nine different companies. During three evenings, conference participants were invited to enjoy selected snacks and choose from a wide range of drinks including cocktails dedicated to different types of instruments. The conference participants had the chance to inform themselves on new instrumental developments, and to discuss instrument performance and principles with corporate representatives, and to expand contacts.

The very last talk of the week was the plenary lecture of Arthur Shapiro (American University) on the exciting non-mass-spectrometric topic "Why Are We Surprised by Only Some of the Things that We See? Visual Illusions, the Brain, and Baseball". He illustrated how illusions help us to understand our visual system and convinced the audience that our perception is almost never an exact representation of the true environment, exemplarily demonstrated for a "curve ball" in baseball. The official conference program closed with a toast in the convention center to say good-bye to ASMS 2011.

Future and related conferences For its 60th anniversary in 2012, the ASMS conference will move to Vancouver, Canada, between May 20 and 24 and compete for visitors with the 19th International Mass Spectrometry Conference (IMSC) in Kyoto, Japan, taking place from September 15–21 in the same year. Beforehand, the ASMS offers well-

attended and more specific meetings on dedicated topics, for example the Asilomar Conference on Metabolomics taking place from September 30 to October 4, 2011, in Pacific Grove, California, or the Sanibel Conference on Mass Spectrometry Technology for Structural Biology taking place January 19–22, 2012, at St Pete Beach, Florida.



The famous blue bear in front of the convention center (photo courtesy of Stefan Schmid)